



19 February 2019

Rose-Anne Hawkeswood  
Department of Planning and Environment  
320 Pitt Street  
Sydney NSW 2001

Our ref: 2127477-62201  
Your ref:

## **Port Kembla Gas Terminal Marine Growth Protection System**

Thank you for the opportunity to provide a summary of some of the key points outlined in our EIS, Technical Paper and Response to Submissions in relation to the Marine Growth Protection Systems and the associated discharge of sodium hypochlorite into Port Kembla waters during regassification mode.

### **1 Summary**

The assessments conducted to date have identified a number of key points in relation to the discharge:

- World Bank environmental guidelines note the concentration of free chlorine at the point of discharge should be maintained below 200 ug/L to protect marine environments
- By introducing reasonable and practicable changes to standard FSRU operating and monitoring procedures, AIE is able to deliver 20ug/L or 10% of the World Bank guidelines at the point of discharge.
- The level of manual recording for laboratory analysis in existing FSRU operations is limited to 20ug/L, and it is likely the discharge will be less than 20ug/L during standard operations
- Based on 20ug/L as the point of discharge, the modelling indicates the level will drop to 2ug/L within a mixing zone of 42.5 metres which is very limited in comparison to the scale of the development and the Inner Harbour receiving waters.
- This is also a conservative estimate given sodium hypochlorite is not, as modelled, a conservative tracer but rather a highly unstable element which degrades very rapidly.
- A reasonable estimate would be that within 15 – 20 meters of the discharge point, residual chlorine levels will be below 13 ug/L
- The risk to the marine ecosystem within these areas, is low as the area will also have been disturbed during excavation of the berth pocket and will be restricted by frequent movements of LNG Carriers to the berth. .
- A schematic showing the approximate extent of the nearfield mixing zone (in green) and zone of concentrations in excess of 13ug/l TRC (in purple) is presented relative to the proposed berth and dredging footprint below.



In view of the above and in line with requirements, all reasonable and practicable actions have been taken to deliver an environmental outcome which is in line with ANZECC's objectives and environmental values for ambient water, as well as reflective of the other land uses, existing water quality and marine ecology of the working harbour.

## 2 Detailed Response

The EPA's initial submission on the EIS queried the adoption of the proposed discharge criteria for releases from the Marine Growth Protection System (MGPS) and requested further assessment of mixing zones and the toxicity of discharges.

The submissions report clarifies that there is wide variation within the policy setting for the identification of trigger values and discharge standards for marine protection and none of them are strictly applicable to the marine environment in a working harbour at Port Kembla

The EIS noted that the **ANZECC guidelines** provide a 95% species protection default guideline value (previously known as trigger value) for total residual chlorine within freshwater aquatic environments of 3 µg Cl/L. No equivalent values are provided for the marine environment however the guidelines note that the freshwater value "was adopted as a marine low reliability trigger value, to be used only as an indicative interim working level".

Given the absence of an ANZECC default guideline value for total residual chlorine within marine environments, consideration was given to the **IFC World Bank Group Environmental, Health, and Safety (EHS) Guidelines for Liquefied Natural Gas (LNG) Facilities**. These guidelines have been developed to represent good international practice for environmental protection based upon the use of existing technologies available for a specific industry at reasonable cost. The guidelines stipulate the following in relation to residual sodium hypochlorite in seawater,

*“Free chlorine (total residual oxidant in estuarine/marine water) concentration in cooling/cold water discharges (to be sampled at point of discharge) should be maintained below 0.2 parts per million (ppm).” (IFC, 2017).*

It is recognised that the applicability of the IFC World Bank guidelines should be tailored to the risks and sensitivity of the local environment. As noted above, the ANZECC guidelines do not include a value for total residual chlorine within marine environments. The **US EPA standards** provide aquatic life ambient water quality criteria for significant risk to marine waters at 13µg/L (acute chlorine criteria) and 7.5 µg/L (chronic chlorine criteria).

ANZECC guidelines are typically considered to be the most relevant guidelines for assessing and managing ambient water quality in natural and semi-natural water resources within Australia. The ANZECC Guidelines present numerical guidelines which can be used as a basis to assess the impact of the development of the Port Kembla Gas Terminal against defined objectives or values for the receiving waters.

The core concept of the ANZECC Guidelines relates to managing water quality for environmental values. For each environmental value, the guidelines identify particular water quality characteristics or ‘indicators’ that are used to assess whether the condition of the water supports that value.

The environmental values expressed as water quality objectives provide goals to assist in the selection of the most appropriate management options for a waterway. The ANZECC Guidelines also advocate an ‘issues-based’ approach to assessing ambient water quality, rather than the application of rigid numerical criteria without an appreciation of the context. This means that the guidelines focus on:

- the environmental values we are seeking to achieve or maintain;
- the outcomes being sought; and
- the ecological and environmental processes that drive any water quality problem.

It should also be noted that the environmental values and respective numerical indicator values apply to ambient background water quality and are not intended to be applied to mixing zones associated with a release from a point source discharge. Discharges from the MGPS therefore need to be considered in recognition of other land uses and existing water quality within the working harbour at Port Kembla.

The project proposes the adoption of the latest technology as part of the MGPS to minimise the residual sodium hypochlorite in discharges as far as practical and reasonable. The technology provider has committed to achieving reduced discharge concentration of 0.02ppm or 20 ug/L on an 80<sup>th</sup> percentile basis to allow adaption to local water quality conditions. This represents a considerable reduction from 0.2ppm or 200 ug/L presented in the EIS based upon good international practice presented in the IFC guidelines and is reflective of the level of recording available for manual sampling.

Additional modelling was undertaken as part of the Submissions Response to characterise the configuration and boundaries of the near-field mixing zone and to more clearly define the resulting dilution factors and concentrations at the edge of the near-field mixing zone based upon the revised 20 ug/l discharge criteria as requested in the EPA submission.

The nearfield modelling indicates that the sodium hypochlorite concentration at the edge of the near field zone of up to 42.5 metres is less than 2 ug/L, and therefore is predicted to comply with the most stringent of the available guidelines (ANZECC guidelines for fresh water, a value of 3ug/L). The average

concentration within the plume is predicted to be 3.0 ug/l, or less. This is considered a good environmental outcome for the project, with a mixing zone essentially restricted to an area within the berth pocket proposed to be dredged as part of the project.

EPA's additional submission states that it is EPA's policy that all practical and reasonable measures should be implemented to ensure a discharge does not have acute toxicity risk at the point of discharge and references the US EPA marine water criteria of 13 ug/L.

The resolution of the near-field modelling makes it difficult to determine the exact distance the reduction from 20 ug/L to 13 ug/L will be achieved, as a result of the mixing effect in the discharge waters. However, a reduction to less than 2 ug/L is achieved within 42.5 metres and plume concentrations are anticipated to be less than half the nominated EPA criteria at the point the plume reaches the harbour floor. The US EPA toxicity criteria is therefore expected to be achieved within very close proximity (15 to 20 metres) of the discharge point and it should be noted the criteria is considered to apply to ambient conditions and any toxicity effect will be restricted to the berth pocket for the project. It should also be noted that the sodium hypochlorite has also been modelled as a conservative tracer, which does not degrade, so concentrations are considered conservative estimates which will be lower in practice.

It is also relevant that any toxicity risk will be restricted to within the proposed footprint of wharf demolition and dredging works within the Inner Harbour. All marine life within the zones described above will have been relocated or removed prior to release of any sodium hypochlorite or associated by products.

Similarly, the predicted zone of impact lies within the proposed berthing area for visiting LNG tankers. Given that this area will be exposed to high velocity currents generated by vessel movements, the likelihood of recolonisation of the area by high value marine species is considered extremely low and the likelihood of sodium hypochlorite related impacts to marine life is low.

The commitment to achieve 20 ug/L of residual chlorine on an 80<sup>th</sup> percentile basis represents a practical and reasonable measure to reduce toxicity risk and a considerable improvement over accepted international practice for the industry. To further reduce chlorine concentrations within the MGPS is not considered practical or reasonable since the MGPS would no longer serve its intended purpose to prevent marine growth within the vessel. Nevertheless the modelling indicates the project will comply with the most stringent of the available guidelines within the NSW policy setting at the edge of the mixing zone and represents an appropriate level of protection for environmental values within a working harbour.

Sincerely  
GHD

**Karl Rosen**

Principal Environmental Consultant  
+61 2 9239 7682